

PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Hot Filling of Plastic Containers

- We NESTLE'S PRODUCTS LIMITED, of Peek Building, George Street, Nassau, Bahama Islands, a company incorporated in the Bahama Islands do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—
- 10 The present invention is concerned with a method of filling plastic containers with a product which is at a temperature above the softening point of the plastic.
- 15 Hot filling of fluid products into cans or glass jars has been practised for some time in industry, particularly in the food industry. In the food and pharmaceutical industries, the products are frequently sterilised by heating just before canning or bottling, and are usually still hot when the filling takes place.
- 20 Many plastic materials (synthetic resins) have properties which make them suitable for use as packaging materials. Furthermore, a number are cheaper than conventional packaging materials such as tinplate or glass, and are thus very useful for disposable containers, that is those which are only used once.
- 25 However, since the softening points of a number of plastic materials, particularly of those which may be economically used as packagings are relatively low, usually below 100°C., the techniques used for hot filling of metal or glass containers are not applicable to containers made from such plastic materials.
- 30 It is an object of the present invention to provide a method of filling plastic containers with a product which is at a temperature above the softening temperature of the plastic.
- 35 The invention accordingly provides a method of sterilising the interiors of plastic containers which comprises introducing into the container a liquid or gaseous sterilizing medium which is at a temperature above the softening temperature of the plastic, whilst the container is surrounded by a cooling liquid.
- 40 In general, it is possible, by using the method according to the invention, to fill into plastic containers liquids which are at a temperature of some 100°C. above the softening temperature of the plastic from which the container is made, that is, the containers may be exposed to temperatures well above those required for complete sterilisation. Thus, for example, one may directly fill products which are at or above sterilisation or pasteurisation temperature.
- 45 Preferably, the filled containers are allowed to remain in the cooling liquid until the product has cooled to below the softening temperature of the plastic material.
- 50 If the container is closed immediately after filling, as is desirable when working under aseptic conditions, the cooling of the air remaining in the container and consequent reduction in internal pressure may lead to an unsightly deformation of the container, particularly when the latter has thin walls.
- 55 According to a feature of the invention, this disadvantage is substantially completely overcome by providing the container with at least one concave surface. In this case, the reduction in pressure does not cause a perceptible deformity since only the concave surface is affected, that is, the cavity or indentation becomes slightly deeper. For example, the bottom of the container may be recessed or indented, or the walls of the container may have one or more dimples.
- 60 The method according to the invention may also be applied to the sterilisation or pasteurisation of plastic containers with a hot liquid or gas.
- 65 If the product is to be filled aseptically, it is generally sterilised or pasteurised immediately before filling and, by using sufficiently high product temperatures, it is possible
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sible to sterilise the containers with the hot product itself. In this way one may avoid an additional process step involving the sterilisation of the containers before filling.

- 5 Preferably, the containers are closed hermetically immediately after filling and are inverted in the cooling medium so as to sterilise the whole of the container. When the container is inverted the remaining air passes through the hot liquid and is itself sterilised.

- 10 If desired, containers sterilised in accordance with the invention may be stored until required without removing the sterilising medium. This technique is particularly suitable for the aseptic filling into plastic containers of products which are not susceptible to hot filling, for example solids or other products which are heat sensitive. In such a case the products may be sterilised or
- 15 pasteurised by other means, for example irradiation, and may then be filled into sterilised containers.

The following experiment illustrates the method according to the invention.

- 25 A beer-bottle shaped container of 700 cc. capacity, having a wall thickness of 0.2—0.3 mm., produced from non-plasticised polyvinyl chloride by blow moulding was im-

mersed up to near its opening in a bath containing tap water. It was observed that at temperatures above 50°C. the container exhibited the so-called "plastic memory" effect and was completely deformed above 65° C. 30

The container was filled with hot paraffin oil, and the oil was allowed to cool. It was found that even with initial oil temperatures of 182° C the container showed no deformation. 35

WHAT WE CLAIM IS:—

1. A method of sterilising the interiors of plastic containers which comprises introducing into the container a liquid or gaseous sterilising medium which is at a temperature above the softening temperature of the plastic, whilst the container is surrounded by a cooling liquid. 40 45

2. A method according to claim 1 in which the sterilising medium is a product which is to be filled into the container. 50

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